

**(57) Abstract:** This invention relates to an arrangement for inputting graphical information into a computer system, where the graphical information arises when a drawing device is moved relative to a base. The base is provided with a position-coding pattern and the drawing device is arranged to detect positions on the base by means of the position-coding pattern. The computer system is arranged to record position information from the drawing device indicating positions within a first area on the base as graphical inputs and position information indicating positions within a second area on the base as information concerning a visual property associated with the graphical input.



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## DATA INPUT ARRANGEMENT

### Field of the Invention

The present invention concerns an arrangement for inputting graphical information into a computer system, and a base suitable for incorporation in such an arrangement. In addition it concerns a drawing device and a storage medium for digital information.

### Technical Background

Systems for inputting graphical information into computer systems are used to a great extent together with various types of graphics programs, CAD programs, web design programs, etc. In such a context the input system makes possible the input of hand-drawn figures into the program.

Input systems of this type often consist of a base and a drawing device. When the drawing device is moved over the base its movement is recorded in the system electronically as a graphical input, which can be transmitted to a computer system in digital form. An example of such an input system is described in US, 4,717,793, A. In this a base is arranged to detect inductively the position of a drawing device on the base. By repeated recording of this information, the movement of the drawing device across the base results in a graphical input. Known input systems are often expensive. In addition they are usually unwieldy, particularly if the base is required to have a large input surface and if it is to be possible to input visual properties of graphic inputs. This makes the use of such input systems more difficult, particularly in mobile applications.

### Summary of the Invention

This invention aims to solve the above-mentioned problems either completely or partly.

This aim is achieved by an arrangement for inputting graphical information into a computer system in accordance with claim 1, a base suitable for use in such an arrangement in accordance with claim 5, a drawing device  
5 in accordance with claim 17, a storage medium for digital information in accordance with claim 19 and a base according to claim 20.

According to a first aspect of the invention an arrangement is provided for inputting graphical information  
10 into a computer system, the graphical information arising when a drawing device is moved relative to a base. The arrangement is characterised in that the base is provided with a position-coding pattern and in that the drawing device is arranged to detect positions on the base by  
15 means of the position-coding pattern. In addition the computer system is arranged to record position information from the drawing device indicating positions within a first area on the base as graphical inputs. Position information from the drawing device indicating positions  
20 within a second area on the base is recorded as information concerning a visual property associated with a graphical input.

Such a position-coding pattern can be designed in the way described in the Applicant's patent applications  
25 WO 00/73983 and PCT/SE00/01667, which are hereby incorporated by reference. Moreover, reference is made to WO/01/16691, the content of which is included in the present specification by reference. Such a drawing device has a number of applications in addition to the input of  
30 graphical information into graphics programs, etc. A user who has such a drawing device for other applications can therefore realise an arrangement in accordance with the invention just by the use of a suitable position-coded base, for example a sheet of paper, and suitable  
35 software, for example in a personal computer. Both the software and the base are relatively cheap to produce, for which reason an arrangement in accordance with the

invention can be achieved at low cost. The arrangement also permits the carrying out of graphical inputs with various visual properties, which can be selected.

In addition an arrangement in accordance with the  
5 invention is suitable for mobile applications, even if the base is made large. If the base is constructed as a sheet of paper it can simply be folded up.

In accordance with a preferred embodiment the computer system is integrated in the drawing device. This  
10 makes possible even greater mobility. A graphical image can thus be produced in the drawing device and, for example, later transmitted via a mobile telephone system to a server, without having a personal computer on site. Alternatively, the computer system may be integrated in a  
15 cellular telephone.

Preferably, the computer system may be devised to display an indication of the latest selected visual property. This allows for acknowledging the user as regards the selected visual property.

20 According to a second aspect of the invention a base is provided for the input of graphical information into a computer system, the graphical information arising when a drawing device is moved relative to the base. The base is provided with a position-coding pattern, which makes it  
25 possible to detect positions on the base using the drawing device, which is arranged to transmit position information to the computer system. The base has a first and a second area. Positions within the first area are intended to be detected by the computer system as graphical  
30 inputs and positions within the second area as information concerning a visual property associated with a graphical input. A sub-area within the second area, where positions within the sub-area are intended to be detected by the base as information concerning a visual property,  
35 is provided with a visible, visual indicator representing this information. This makes the use of an arrangement such as that described above, considerably easier.

The first and the second area on the base are preferably separated from each other in a visible way, which makes it easier for a user to work with an arrangement according to the invention.

- 5       The information concerning visual properties can preferably consist of colour information, which enables more expressive graphical inputs to be carried out, as several colours can be used.

- 10       According to another embodiment the information concerning visual properties can consist of line type information, which enables more expressive graphical inputs to be carried out, as several types of line can be used, for example solid, dotted and broken.

- 15       According to a further embodiment the information concerning visual properties can consist of line width information, which enables more expressive graphical inputs to be carried out, as several line widths can be used.

- 20       When the second area is used for colour information, a sub-area within the second area, where a position within the sub-area is intended to indicate a particular colour, can preferably be coloured with this colour. This results in a user interface, which is independent of language.

- 25       According to another embodiment a sub-area within the above-mentioned second area, where a position within the sub-area is intended to indicate a particular colour, can be provided with an alphanumeric indicator signifying this colour. This makes it possible for a user  
30       with limited colour vision to be able, in spite of this, to carry out graphical inputs with colour properties as required.

- 35       According to yet another embodiment the second area can comprise a set of visually separated sub-areas, each provided with at least one alphanumeric symbol. This makes possible the input of properties from a great number of visual properties even though only a small

second area is provided. This is because a combination of sub-area indications can be made arbitrarily long.

According to a third aspect of the invention a drawing device is provided for inputting graphical information into a computer system, where the graphical information arises when the drawing device is moved relative to a base. The drawing device is arranged to detect positions on the base by the utilisation of a position-coding pattern marked on the base. A computer system integrated in the drawing device is arranged to detect positions within a first area on the base as graphical inputs and positions within a second area on the base as information concerning visual properties associated with a graphical input. The advantages of such a drawing device are shown in the discussion above. The drawing device can also be varied in a number of ways corresponding to the base described above.

According to a fourth aspect of the invention a storage medium for digital information is provided, which can be read by a computer system, the storage medium containing a program for inputting graphical information into a computer system where the program defines the following steps: recording of position information from a drawing device indicating positions within a first area on a base as graphical inputs; and recording of position information from a drawing device indicating positions within a second area on the base as information concerning visual properties associated with a graphical input. Such a program makes possible the function of an arrangement of the type described above. The program can also be varied in a number of ways corresponding to the base described above.

#### Brief Description of the Drawings

Fig. 1 shows an arrangement for inputting graphical information in accordance with the invention.

Fig. 2 shows an alternative embodiment of a base intended to be used in such an arrangement.

Fig. 3 shows a further embodiment of such a base.

Fig. 4 shows diagrammatically the steps in a computer program suitable for use in an arrangement in accordance with the invention.

#### Description of Preferred Embodiments

Fig. 1 shows an arrangement for inputting graphical information in accordance with the invention. The arrangement comprises a drawing device 1, which is moved over a base 3. In the embodiment shown a trace 5, preferably of ink, is deposited on the base 3. This is not, however, necessary. The base can be made of an easily erasable material, which means that the base 3 can be used many times. A position-coding pattern 7 (shown enlarged) is printed on the base.

The position-coding pattern 7 is so designed that if part of the pattern with a certain minimum size is recorded, then this part of the pattern's position in the pattern and thereby on the base can be determined unambiguously.

The positioning coding pattern 7 can advantageously be of such a type as shown in the Applicant's above-mentioned Applications WO 00/73983 and PCT/SE00/01667 where each position is coded by a number of symbols and where a symbol is used to code a number of positions. The position-coding pattern 7 shown is constructed as shown in WO 00/73983, where a large dot represents a "one" and a small dot represents a "zero". It is, however, also possible to design the position-coding pattern 7 as described in PCT/SE00/01667, where different displacements of a dot in relation to a raster point code different symbol values.

The drawing device 1 is arranged to detect positions on the base 3 utilising the position-coding pattern 7. When the drawing device 1 is moved relative to the base 3



and in contact with this, the drawing device records a series of positions on the base 3, which series is transmitted to a computer system 9, in this case a personal computer. The computer system may also be integrated in a cellular telephone. The transmission of the position information can be carried out by means of various types of cables or by means of an infrared link. However, a short-range radio link is preferably used, for example in accordance with the BLUETOOTH standard. The position information can be transmitted as a set of pairs of co-ordinates, but preferably the drawing device 1 first converts the series of pairs of co-ordinates into a polygon train which is then transmitted. It is recognised that the transmission can be carried out in several steps. For example, an input can be carried out with the drawing device and base and then the position information is transmitted to a personal computer. This information can then be transmitted over a network to a server, in which interpretation of the graphical inputs is carried out.

The drawing device 1 may be provided with means for allotting a detected position a time-stamp. This enables the order of graphical inputs to be preserved. The base 3 comprises a first area 11 corresponding to a first number of pairs of co-ordinates, and a second area 13, corresponding to a second number of pairs of co-ordinates. The first area 11 and the second area 13 on the base 3 are visually separated, in this case by means of a printed line 15.

The computer system 9 is arranged, using suitable software, to record position information from the drawing device, for example in the form of a polygon train, within the first area 11 as a graphical input. In the example shown, a trace 5 is deposited as mentioned when the drawing device 1 is moved over the base 3 in contact with this. As this movement takes place within the first area 11, the computer system 9 records the position in-

formation which then arises and which is transmitted as a graphical input 17. The graphical input 17 is thus graphical digital information, which corresponds to a copy of the trace 5. This graphical input 17 can, for example, be reproduced on the screen 19 of the computer system 9. When a position within the first area is recorded, a corresponding pixel in an image in an application is set accordingly to "one". A graphical input thus means that at least one image pixel, stored or displayed, changes state. A number of graphical inputs can make up an image which, for example, can be sent with an e-mail.

When the drawing device detects a position, this position is allotted a time-stamp, which corresponds to the time of detection. This timing information may be saved and used by the system in order to reproduce, not only a completed drawing, but also the manner in which the drawing was formed.

The computer system 9 is also arranged to record position information from the drawing device 1 within the second area 13 as information concerning a visual property associated with a graphical input. For example, as already shown, after having created and recorded a graphical input 17, the user can point with the drawing device 1 at a particular sub-area 21 in the second area 13 and thereby assign to the graphical input 17 a property (for example the colour blue) associated with this sub-area 21. This can also be done before the graphical input 17 is carried out, depending upon how the software in the computer system 9 is set. A sub-area 21 within the second area 13, where a position within the sub-area 21 is intended to indicate a particular visual property, is suitably provided with a visible, visual indicator 22 representing this property.

The computer system can also be integrated into the drawing device. In this way a complete graphic image can be produced in the drawing device and then, for example, transmitted by means of a mobile telephone system to a

server or the like. The drawing device 1 can also be integrated into, for example, a mobile telephone. It is also possible to let a computer system in the drawing device identify which positions are to be interpreted as graphical inputs and which are to be interpreted as visual properties. The information corresponding to graphical inputs with particular properties can then be transmitted to another computer system, for example a personal computer.

10        Fig. 2 shows an alternative embodiment of a base 3' intended to be part of an arrangement according to the invention. Also here the base 3' comprises a first area 11' and a second area 13'. In this embodiment these are produced as physically separate units. As in the previously shown embodiment, the first area 11' is used to create graphical inputs and to accept a corresponding trace 5'. The second area 13' is used to assign visual properties to the graphical inputs.

20        When a visual property is chosen, this property may preferably be fed back to the user in some way in order to acknowledge the choice of visual property. If, for instance, the drawing device communicates with a personal computer and the user chooses the visual property blue, the legend "blue" may be displayed on the monitor of the personal computer. If the drawing device communicates with a cellular telephone, a display on this telephone may be used in the same way. Alternatively, a display could be provided on the drawing device itself in order to achieve this functionality.

30        Fig. 3 shows a further embodiment of a base 3" according to the invention. The base may generally consist of a paper sheet, which is an inexpensive solution. It may also be made of a synthetic material such as polymer, which could allow ink-text and -figures on the surface to be easily erased. The base, as mentioned, is provided with a position-coding pattern. Also here the base 3" comprises a first area 11" and a second area 13". As in

the previously shown embodiment the first area 11" is used to create graphical inputs and to accept a corresponding trace 5". The second area 13" is used to assign visual properties to the graphical inputs. The second  
5 area 13" has here a number of divisions 23, 25, 27, 29, 31, 33, each containing a number of sub-areas 21". Each sub-area 21" comprises a set of positions. When a computer system in the arrangement detects any of the positions within this set, this is recorded as information concerning a visual property corresponding to this  
10 sub-area 21". The position codes in the sub-area 21" do not normally occur within other sub-areas in the base 3".

The information concerning a visual property can be colour information. The base 3" has here a first division  
15 23 and a third division 27 in the second area 13" which are used for recording colour information. The sub-areas within the first division 23 are printed with alphanumeric indicators 22" signifying the colours represented by the sub-areas. In this case these consist of the names of  
20 the colours, but, for example, colour codes could also be used. The sub-areas in the third division 27 have been coloured with the colours (shown here by different shading) they represent, which provides a user interface, which is independent of language. The second division 25  
25 is used in a similar way to represent line thickness information and the fourth division 29 is used to represent line type information. In fig 3, there is shown 16 separate sub-areas, each having a numeral 0 to 9 and letters A to F attributed to each sub-area. When the  
30 drawing device points at one such area a numeral or letter corresponding to this sub-area may be inserted in the message. In this way, character recognition can be avoided. There may be further sub-areas, for example corresponding to all commonly used letters A to Z and a  
35 to z to enable insertion of normal characters. This may be used for specifying for instance an e-mail address, a fax number or a keyword. These sub-areas may thus be used

to achieve non-graphical inputs as well as applying properties to graphical inputs. In this way virtually any type of simulated keyboard with for instance ASCII-characters may be achieved.

5       A fifth division 31 in the second sub-area 13" comprises visually separated sub-areas, each provided with at least one alphanumeric character. By pointing at a sequence of these characters the user can input an arbitrarily long code, corresponding to a particular  
10       visual property. In this way a small surface can be provided with means for reliable indication of a large number of properties.

      A sixth division 33 is used for specifying in which layer a graphical input is to be deposited in for example  
15       a drawing. Applying graphical inputs on different layers may be useful in many applications. For instance, a machine drawing may be completed in a first layer and legends explaining features of the machine may be placed in a second layer. Then it is optional whether the  
20       explanations should be displayed or not. Different recipients may also be emailed with different sets of layers.

      It is also possible to interrelate different sub-areas in the second area. Thus, for instance, a specific  
25       layer may be assigned specific properties, such as a specific line width and a specific line colour.

      Graphical inputs may be assigned other types of visual properties. A graphical input may be assigned a "text"-property, which makes the system apply OCR  
30       (Optical Character Recognition) functionalities on the input. A recorded legend may be given a visual property such as "bold" or "italic" by using a corresponding subarea.

      The same concept applies to geometrical forms such  
35       as circles and rectangles. A coarse circle form inputted by the user may then, for instance, be perfected by the system, by applying a "circle" subarea. Alternatively the

user may specify a centre and radius for a circle in the first area and mark a "circle" subarea in the second area. Similarly, logos and other figures may be drawn.

Other subarea-functions may be "erase" (delete  
5 objects in an area), "clear" (delete all objects) and "undo" (delete the latest inputted object).

Fig. 4 shows diagrammatically the steps in a computer program suitable for incorporation in an arrangement according to the invention where a base has two areas.  
10 The program, which can be stored on any digital storage medium (for example a diskette), defines steps as follows. After the identification 41 of a position, which is preferably carried out in the drawing device, it is determined 43 whether the position lies within the first  
15 area. If such is the case, there is a first recording 45 of the position information as a graphical input. This first recording comprises a number of subroutines (not shown). Otherwise the position lies within the second area, so that a second recording 47 of the position information takes place as information concerning visual  
20 properties of a graphical input. The second recording also comprises a number of sub-routines (not shown).

The scope of the patent protection applied for is not restricted to the embodiments described above. The  
25 invention can be varied and changed in a number of ways within the scope of the following claims.

## CLAIMS

1. An arrangement comprising a base (3), a drawing device (1) and software in a computer system (9), for inputting graphical information into the computer system (9), the graphical information arising when the drawing device (1) is moved relative to the base (3), characterised in that the base (3) is provided with a position-coding pattern (7) and in that the drawing device (1) is arranged to detect positions on the base (3) by means of said position-coding pattern (7) for the transmission of position information to the computer system (9), the computer system (9) being arranged using said software to record position information from said drawing device (1) indicating positions within a first area (11) on said base (3) as graphical inputs, and to record position information from said drawing device (1) indicating positions within a second area (13) on said base (3) as information concerning visual properties associated with a graphical input.

2. The arrangement for inputting graphical information according to claim 1, characterised in that said computer system is integrated in said drawing device.

3. The arrangement for inputting graphical information according to claim 1, characterised in that said computer system is integrated in a cellular telephone.

4. The arrangement for inputting graphical information according to any of the preceding claims, characterised in that the computer system is devised to display an indication of the latest selected visual property.

5. A base for inputting graphical information into a computer system, the graphical information arising when a drawing device is moved relative to the base,

characterised in that the base (3) is provided with a position-coding pattern (7) which makes it possible to detect positions on the base (3) using the drawing device, which is arranged to transmit position information to the computer system; in that the base (3) has a first area (11) and a second area (13), positions within the first area (11) being intended to be detected by the computer system as graphical inputs and positions within the second area (13) being intended to be detected by the computer system as information concerning visual properties associated with a graphical input; and in that a sub-area (21) within said second area (13), where positions within the sub-area (21) are intended to be detected by the computer system as information concerning a visual property, is provided with a visual indicator (22) representing this information.

6. The base according to claim 5, characterised in that said second area is separated in a visible way from said first area.

7. The base according to claim 6, characterised in that said second area is physically separated from said first area (Fig. 2).

8. The base according to claim 5, characterised in that said information concerning visual properties consists of colour information.

9. The base according to claim 5, characterised in that said information concerning visual properties consists of line type information.

10. The base according to claim 5, characterised in that said information concerning visual properties consists of line thickness information.

11. The base according to claim 8, characterised in that a sub-area within said second area, where a position within the sub-area is



intended to indicate a particular colour, is coloured with that colour.

12. The base according to claim 8,  
c h a r a c t e r i s e d in that a sub-area (21", Fig.  
5 3) within said second area (13", Fig. 3), where a  
position within the sub-area (21", Fig. 3) is intended to  
indicate a particular colour, is provided with an  
alphanumeric indicator (22", Fig. 3) signifying this  
colour.

10 13. The base according to claim 12,  
c h a r a c t e r i s e d in that said alphanumeric  
indicator consists of the name of the colour.

14. The base according to claim 12,  
c h a r a c t e r i s e d in that said alphanumeric  
15 indicator consists of the colour's colour code.

15. The base according to claim 6,  
c h a r a c t e r i s e d in that said second area  
comprises a set of visually separated sub-areas, each  
provided with at least one alphanumeric symbol.

20 16. The base according to claim 5,  
c h a r a c t e r i s e d in that said information  
concerning visual properties is used for specifying a  
layer in which a graphical input is deposited.

17. A drawing device for inputting graphical infor-  
25 mation into a computer system, the graphical information  
arising when the drawing device is moved relative to a  
base, c h a r a c t e r i s e d in that the drawing de-  
vice is arranged to detect positions on said base by  
means of a position-coding pattern marked on the base;  
30 and in that a computer system integrated in the drawing  
device is arranged to detect positions within a first  
area on the base as graphical inputs and positions within  
a second area on the base as information concerning  
visual properties associated with a graphical input.

35 18. A drawing device as claimed in claim 16,  
c h a r a c t e r i s e d in means for allotting a detected  
position a time-stamp.

19. A storage medium for digital information, which can be read by a computer system, the storage medium containing a program for inputting graphical information into a computer system, c h a r a c t e r i s e d in that  
5 said program defines the following steps:

- recording of position information from a drawing device indicating positions within a first area on a base as graphical inputs, and
- recording of position information from a drawing  
10 device indicating positions within a second area on said base as information concerning visual properties associated with said graphical inputs.

20. A base for inputting information into a computer system, c h a r a c t e r i s e d in that the base (3) is  
15 provided with a position-coding pattern (7) which makes it possible to detect positions on the base (3) using a drawing device, which is arranged to transmit position information to a computer system; in that the base (3) has an area (13), and in that a sub-area (21) within said  
20 area (13), where positions within the sub-area (21) are intended to be detected by the computer system as specific information, is provided with a visual indicator (22) representing this information, wherein said area comprises a set of sub-areas, each provided with at least  
25 one alphanumeric symbol.

21. A base according to claim 20, in which said sub-areas are visually separated.

22. A base as claimed in claim 20 or 21, wherein said specific information is an ASCII-code corresponding  
30 to said visual indicator.

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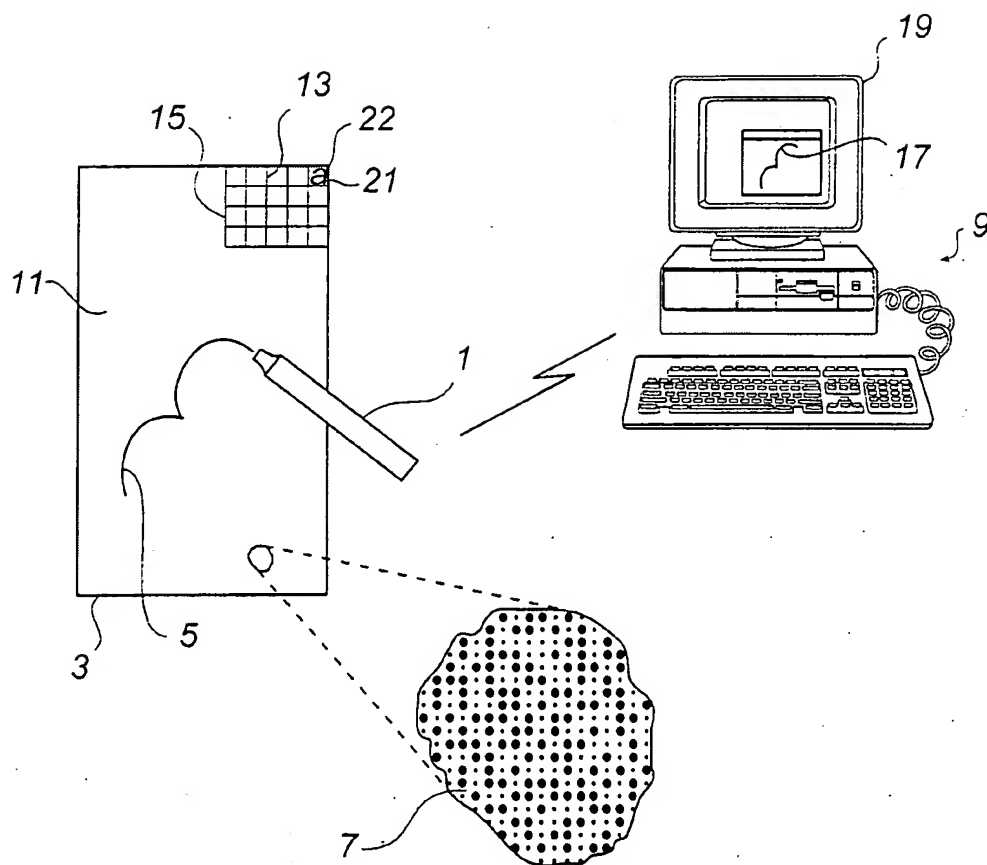
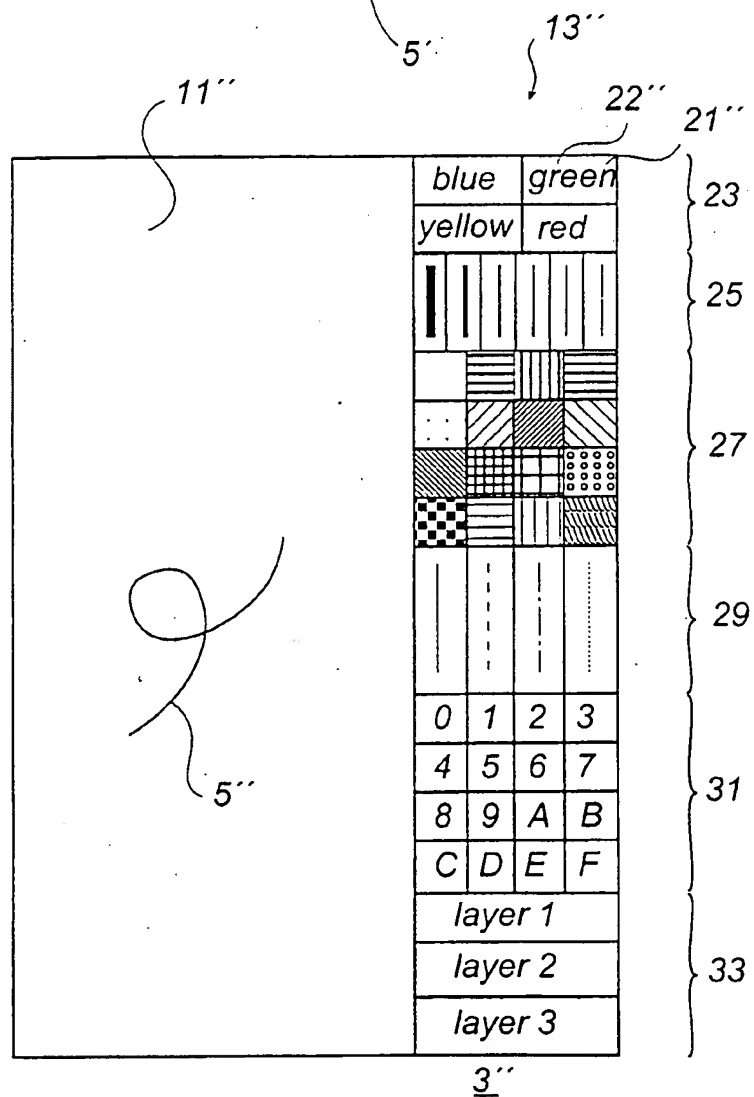
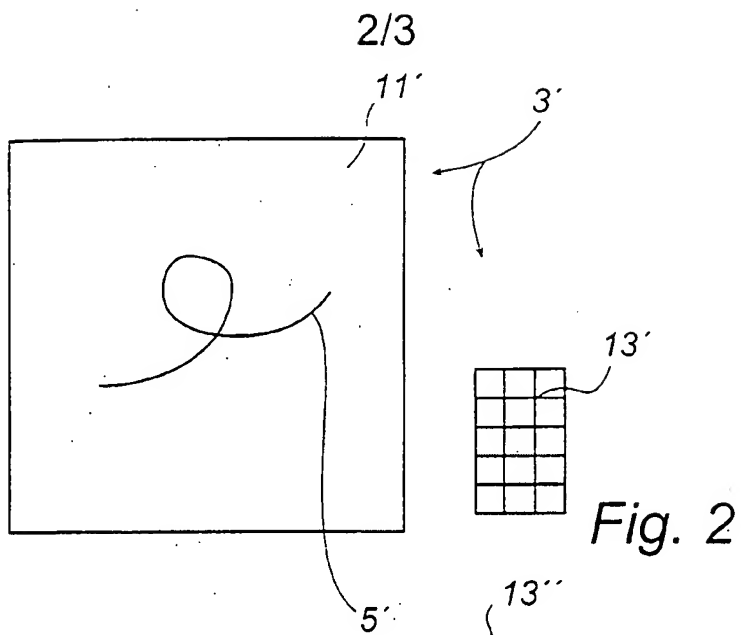


Fig. 1



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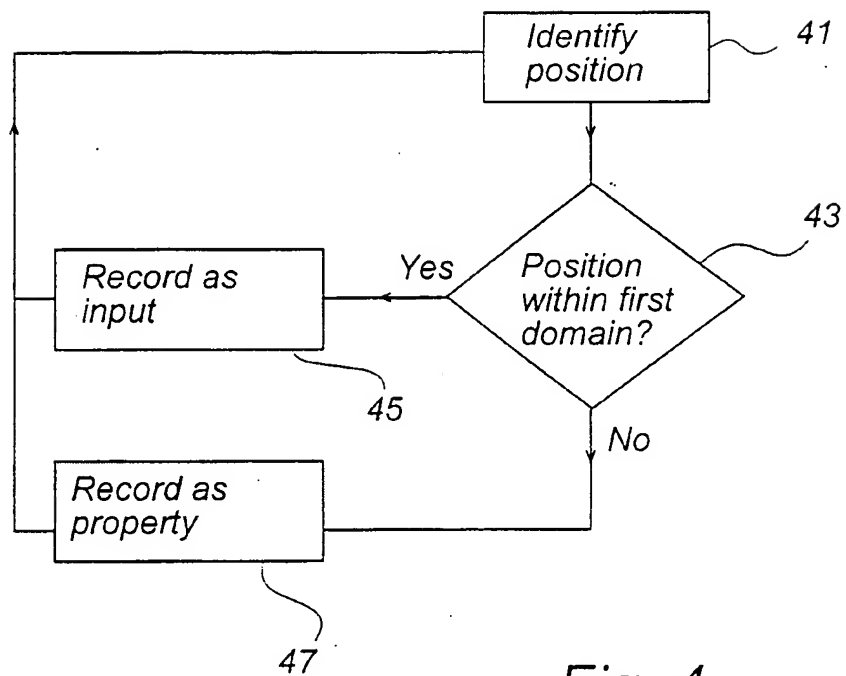


Fig. 4

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 01/00585

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06F 3/033, G06K 11/18

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G06F, G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI-DATA, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|-----------|---|-----------------------|
| A         | US 5852434 A (SEKENDUR), 22 December 1998<br>(22.12.98), column 1, line 8 - column 4, line 24,<br>figure 7, abstract<br>--        | 1-22                  |
| A         | US 5652412 A (LAZZOUNI ET AL.), 29 July 1997<br>(29.07.97), column 2, line 38 - column 3, line 33,<br>figures 7,9, abstract<br>-- | 1-22                  |
| P,A       | WO 0031682 A1 (GENS, DANIEL), 2 June 2000<br>(02.06.00)<br>-----  | 1-22                  |

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents

"A" document defining the general state of the art which is not considered to be of particular relevance

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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

30/04/01

International application No.

PCT/SE 01/00585

| Patent document<br>cited in search report |         |    | Publication<br>date | Patent family<br>member(s) |            | Publication<br>date |
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| US  | 5652412 | A  | 29/07/97            | NONE                       |            |                     |
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|   |         |    |                     | DE                         | 29824287 U | 18/01/01            |
|   |         |    |                     | DE                         | 29824288 U | 25/01/01            |
|   |         |    |                     | DE                         | 29923452 U | 19/10/00            |
| -----                                     |         |    |                     |                            |            |                     |